Speech-Driven, Patient-Centered Access to Three Oncology Knowledge Sources: How Might it Work?*

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Many physician information needs stem from encounters with patients. Our exploration of these information needs in the context of medical oncology has led us to develop a patient-centered model of "knowledge access". To bring this model closer to the point of care, it is designed to be driven by spoken commands. The model is embodied in a demonstration system that builds on earlier work of a prototype "Integrated Oncology Workstation." The results of a "needs assessment" analysis will be presented in the form of two patient scenarios -- a fairly typical case of breast cancer, and a more medically complicated case of rectal cancer. The demonstration will use these scenarios to provide a context in which the system will satisfy the resulting physician information needs.

It is widely recognized that physician information needs tend to be patient specific. In building a system to satisfy these needs, it is increasingly apparent that: 1) the information already available about a patient from selected items in a Computer-based Patient Record (CPR) should be leveraged maximally, 2) the system should anticipate certain physician knowledge needs from the current context, 3) the Unified Medical Language System (UMLS®) Knowledge Resources should be utilized to identify the relevant concepts and appropriate information resources, and 4) a "hands-free" interface allowing spoken commands should be an option to guide any required interactions.

Such a system would try to satisfy the information needs by placing the user in relevant "neighborhoods" of one of three oncology knowledge sources: PDQ®, CANCERLIT®, or P&PO[1]. PDQ is a cancer information database, and CANCERLIT is a cancer citation database, both supported by the National Cancer Institute (NCI), while P&PO ("CANCER: Principles and Practice of Oncology")[2] is a textbook available in electronic form. The system would do this by using components of a "Knowledge Server".

A more difficult challenge is to envision what a CPR working in conjunction with a Knowledge Server would actually look like. Questions arise, such as "Would it save time?", "Is spoken input useful?", or "Would a health-care giver be able to use it?" Such questions are central to evaluating any proposed system. To answer these questions, we constructed a prototype, building on previous work on the design of an integrated workstation for oncologists[3]. We then used the prototype to pose such questions to as many different kinds of audiences as possible.

A proposal for a Knowledge Server standard is described in a parallel SCAMC submission[4]. Our demonstration will illustrate how that Knowledge Server might be used to help satisfy the physician information needs generated by two longitudinal patient scenarios formulated by a medical oncologist (RWC). One metric by which we evaluated the prototype is an estimate of the amount of time it would take a computer-literate physician, with access to all relevant knowledge sources in his or her office, to satisfy the same knowledge needs. Anecdotal evaluation shows that satisfying the knowledge needs using currently available electronic and paper sources would take up to an hour per patient visit; the prototype can satisfy these same needs in minutes. While the CPR is simulated and the patient information was synthesized, all the content displayed from PDQ, CANCERLIT, P&PO and the UMLS Metathesaurus® is real and the citation searches are performed in real time. The navigation permitted by the prototype is sufficient to illustrate a form of uniform access to the heterogeneous sources.

After some two dozen demonstrations in front of audiences including academic physicians, private physicians, medical students, software developers, and CPR vendors, we have concluded that: 1) reaction to the use of speech input varies greatly -- some love it, and some are not interested, 2) reaction to the notion of a Knowledge Server has been uniformly positive, and 3) integration of a CPR with a Knowledge Server generates positive audience reaction exceeding that accorded either component demonstrated individually.

References

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